



Patent Application of

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For

**A HEAD WEARABLE COMMUNICATIONS ELECTRONIC [Cap/visor**  
**integrated wireless multi-media] APPARATUS [(multi-media implies**  
**communications and entertainment capabilities)]**

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**HEAD WEARABLE COMMUNICATIONS ELECTRONIC [Cap/visor  
integrated wireless multi-media] APPARATUS [(multi-media implies  
communications and entertainment capabilities)]**

**CROSS REFERENCE TO RELATED APPLICATIONS**

5796374	Aug 1998	Cone ET AL
5546099	Aug 1996	Quint ET AL
5089914	Feb 1992	Prescott
5003300	March 1991	Wells
6236969	May 2001	Ruppert ET AL
5191602	Mar 1993	Regen ET AL
4882745	Nov 1977	Silver
4051534	Sept 1977	Dukich ET AL
6,167,413	Dec 2000	Daley

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## **STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH FOR DEVELOPMENT – NA**

## **INCORPORATION-BY-REFERENCE OF MATERIAL SUBMITTED ON A COMPACT DISC – NA**

### **BACKGROUND OF THE INVENTION**

#### **1. Field of the invention**

This invention relates to the field of Head Wearable hands free [solar powered] cap[/visor] brim integrated Communications and [entertainment] Electronic devices and more particularly to an apparatus that is practically undetectable [invisible], applies voice recognition and heads up display technology, and applies to hands free integration of combinations of popular commercial hand held products to include cell phones, personal communications devices, beepers, FM radio receivers, GPS receivers, voice recorders, organizers, limited internet, digital photography and video recording, limited internet, and broadcast TV reception.

This invention relates to the modular systems integration of several existing and proven communications and [entertainment] electronics technologies with a head wearable cap [visor] brim resulting in a compact, lightweight, undetectable, integrated, hands free, manual or voice activated, heads-up (digital) displayed, solar powered, all weather personal communications electronics [entertainment] multi-media system, whose baseline functional capability could include but not be limited to combinations of the following electronics capabilities; FM radio reception, digital music (MP3) playback, cell phone, beepers, voice reorders, personal two way communications, organizer, cell phone, limited internet, GPS, and potentially broadcast TV reception. At the high end of this inventions capability, the system could be configured for low resolution digital photography, video recording and full wireless voice and data networking [wearable computing]. The Head wearable Communication Electronics [cap/visor Integrated Multi-Media System] Apparatus could be made up of discrete media functions identified above or combinations of the above-mentioned communications and entertainment media, depending on the

user's preferences and the appropriate digital electronic circuit packaging scheme.

## **BACKGROUND - DESCRIPTION OF PRIOR ART**

Presently inventors and manufacturers have developed a wide variety of hands free and wearable communications and electronics devices. Ruppert ET AL discloses in patent 6,236,969 dated may 2001, a wearable telecommunications apparatus with voice/speech control features, based on a concept of a self contained telephone headset that includes an integral antenna, power supply, on board electronics and circuitry for RF and IF communications. The apparatus is held in place via a headband, and uses voice recognition technology as a prominent feature. The system runs off of battery power which would call for replacement batteries or recharging. The system would have to be placed on the users head when operating and otherwise be carried in some sort of case or container when not in use. My invention is always in place, practically undetectable [invisible], completely innocuous when operating or stowed, solar powered, RF safe by virtue of antenna location, and offers the user a much wider range of

consumer communications electronics [entertainment] capabilities.

In us patent 5,796,374, issued on August 18, 1998, Cone ET AL proposed a wearable support for an image display system that was to be worn on a users head. The principal application called for a head-hugging member made of a multi-elastic material that contained a rigid bill that would support an image display module. A separate image-generating module would be strapped to the operator's belt or otherwise carried. While this patent had little in common with my proposed device, this patent was of interest because an alternate embodiment showed a baseball cap as the head hugging member with the image display device mounted on the rim using a through the rim set of mirrors and prisms to get images from the image display device to the users eye.

In US Patent 6,167,413, issues Dec 26, 2000, Daley, like Cone proposed a wearable computer apparatus with three primary components, a computing module, a visor mounted display and an auxiliary unit, al of which were big bulky, visible, cumbersome, hand operated, and the wearer had to be at a complete halt to access the device. The afore mentioned

devices have environmental restrictions since they cannot be  
operated in inclement weather, need manual intervention, and  
are clearly visible in the head mounted components and the  
belt mounted devices. My invention can be worn by the wearer  
whether in operation or not completely undetectably, without  
any noticeable discomfort in all weather conditions, and  
perform simple functions such as provide the wearer with FM  
radio signals or pass voice or data in a fully networked cell  
phone communications configuration. The focus for my  
invention should not be on the head mounted display. There  
are some functional combinations that would not need a head  
mounted display, such as a FM tuner, voice recorder, MP3  
player or simple walkie talkie. The electronics for those  
devices have been drastically over the last several years and  
could be easily packaged into my electronic module and be  
fully functional without the need for a head mounted display.  
With the advent of Blue Tooth technology, the display function  
could be synchronized with a PDA. Blue Tooth capability will  
be an integral part of my invention. My invention represents  
a hands free, undetectable, all weather, RF safe, continuous  
power communications electronics apparatus which will provide  
simple communication electronics functionality to the casual  
wearer, and complex multi tasking voice and data networking

capabilities with base stations and data bases for the professional.

Most of the media functions identified above have been available for many years first in bulky analog configurations, then in discrete downsized digital packages. Across the board, all of the communications[/entertainment] electronics devices were historically designed for individual functionality, to be hand held, battery powered, stored in pockets, belt clips and carrying cases until used. Recently, some manufacturers have integrated cell phones with limited internet, MP3 playback and beeper capabilities, and those design advances have proven to be popular with consumers. Once again, as manufacturers further downsized the electronics packaging, and integrated over several important communications or electronics [entertainment] functions, the design baselines still had the consumers holding the device when in use, storing the device in inconvenient locations when not in use, and changing or recharging batteries. The consumer could scarcely carry and operate more than one or two of the discrete media systems, and could never think of operating them during inclement weather. Wire entanglements were and continue to be prevalent for the earphones. Cell phone antennas were radiating RF energy to close to the ear canal



raising medical concerns. Consumers were driving with one hand while holding a cell phone with the other, causing an inordinate amount of motor vehicular accidents, resulting in many localities passing strict ordinances and stiff fines against operating cell phones while driving. The prior art was always obtrusively visible when operated by the user, and invariably had to be stowed in some sort of a carrying case when not in use. The electronics module of this invention is always cleverly hidden in plain site beneath the user's cap[/visor] brim and always available at a moments notice for operation without the slightest inconvenience to the user[/operator].

## **SUMMARY OF THE INVENTION**

By means of the present invention, consumers will have access to a device that affords them an integrated complement of communications and electronics [entertainment] features in a wearable, hands free, undetactable, all weather, solar powered, blue tooth synchronized, voice activated package that is completely innocuous whether in use or stowed. The device offers advantages in antenna radiation safety and comfort and does not require carrying cases or storing devices when not in

use. The solar cell will provide continuous power to the electronic module precluding the need for replacing batteries or recharging the electronic module via an adaptor. The visual display can provide a host of information to the user, to include, operational menu's, limited internet data, hands free digital photography or video, hands free position locating (GPS), and hands free broadcast TV.

It is a further object of this invention to provide the consumer with an apparatus comprised of the electronic components of existing communications and electronics [entertainment] products whose features are integrated and repackaged into the electronics module and worn in operation or stowed throughout the day without any inconvenience to the user or without having the user display any unsightly electronic hardware. Many cell phones on the market today feature voice activation, personal communications, Blue Tooth connectivity, beeper and other functions. The cell phones are very light and the hand held devices are very small. The electronics circuitry within the hand held cell phones could very easily be repackaged in the electronic module for the apparatus that I am proposing. The same holds true for hand held GPS receivers and TV's. The hand held packaging has been

vastly reduced in size and the quality of the diminutive displays has been enhanced, implying the electronics designs for these two products are prime candidates for repackaging into the electronics module of the apparatus proposed herein.

These and other objectives of the present invention are achieved with this hands free Head Wearable baseball cap integrated Communication Electronics [multi-media] apparatus configured with the electronics components of popular consumer communications and electronics [entertainment] devices. The packaging of the Head Wearable Communication Electronics [multi-media] apparatus components above and below the brim of a baseball cap fixes these components to the cap and provides unprecedented utility to the user/operator regarding the three major components of the Communication Electronics [multi-media] apparatus, the electronics module, the solar cell and the antenna. This invention is the first to present an everyday wearable platform for a solar cell large enough to sustain the communications and [entertainment] electronics components involved herein - the baseball cap brim. This invention provides a fixed mounting location for the antenna with both an active and stowed position, far enough from the ear canal to preclude the RF health issues that concerned hand

held cell phone users. This invention packaged the electronics components underneath the brim of the baseball cap making that assembly virtually undetectable [invisible] and weather proof to the user and anyone else unless the operator uses the display or the microphone boom for private conversations. When not in use, all components of the Head Wearable Communication Electronics [multi-media] apparatus are stowed on the baseball cap and more or less undetectable to the consumer. At any point in time if the consumer needs to make a call, listen to FM stereo or MP3, take a digital still photograph, all it takes is touching the power button, put one or both earphones in the ears, drop the display, make selections via voice commands, stow the display and enjoy the conversation or music entertainment.

## **BRIEF DESCRIPTION OF THE ILLUSTRATIONS**

FIG. 1 is an exploded perspective view of all the major components of the hands free head wearable cap[/visor] brim integrated communication electronics [multi-media] apparatus.

FIG. 2 is the same as FIG. 1, except that the electronics module has been inverted to illustrate the two active pins on the top of the module.

FIG. 3 is the underside of a head wearable cap brim with the electronics module mounted to the underside of the head wearable cap brim according to the preferred embodiment of the present invention.

FIG. 4 has the electronics module mounted on the underside of the head wearable cap brim mounted on the head of a user, as that user tilts his head up.

FIG. 5 is a representation of the solar cell and antenna mounted on the upper surface of the head wearable cap brim as the user tilts his head down.

FIG. 6 is a straightforward view of the head wearable cap brim integrated communications electronics system. Note that the visual display is stowed, and the electronics module is not visible.

FIG 7 is identical to 6 except that in this rendering, the display is lowered and active showing the digital camera lens mounted on the back of the display cover.

FIG. 8 is the right side exposure with the visual display deployed, the antenna active and the right earphone in use.

Fig. 9 is the left side view with microphone boom deployed and the left side earphone active.

Fig. 10 is the frontal view with the visual display and camera lens deployed and active.

Fig. 11 is the right side view with a full face visual display deployed in the viewing position.

Fig. 12 is the dissembled view of all the components highlighting the external memory card and the slot for it in the electronics module.

## **DETAILED DESCRIPTION OF THE INVENTION**

In the interest of better presenting the intent of this invention, reference will now be made to a preferred embodiment, integrating the hands free head wearable communication and electronic [entertainment] apparatus with the common baseball cap which is illustrated in drawings 3-9. Providing a detailed description of this invention against this embodiment should not represent a limitation in the scope

of this invention as a head wearable apparatus. It is also the intent of this invention to convert clumsy and obtrusive hand held battery powered singularly functioned devices to the hands free, undetectable, all weather, solar powered, always available yet innocuous apparatus by integrating and repackaging the existing technology into the electronics module. Detailed descriptions of the functional electronics used to support the communications and electronic [entertainment] capabilities will not be offered.

Fig. 1 is a layout of all of the components of the hands free head wearable multi-media apparatus shown free of the cap [visor] brim that it will typically attach to. The apparatus illustrated in Fig. 1 comprises an electronic module 1 that will house all of the systems electronics, a solar cell 2 that will continually recharge the systems battery, an antenna 3, for all wireless functions, and earphones 4 for private reception of communications and electronic [entertainment] information.

The key element in this invention is the electronic module casing 1. It will be hollow and made up of a moldable [plastic] material [measuring approximately 6" long, 2" wide, by .5" thick,] shaped to the contour of the underside of the baseball cap brim [or sun visor]. It will be tapered to a

narrow edge all along the front and side edges and come almost flush with the lower surface of the baseball cap brim. The electronic module case 1 will widen from front to rear and from both sides to the middle [achieving a width of about .5 inches at the rear of the electronics module or where the cap brim meets the forehead of the wearer]. There is ample space within the hollow case to configure the functional electronics components from individual or several integrated communications and electronic [entertainment] devices and break out the wiring for input/output devices such as power, antennas, speakers, microphones, visual display, etc., to match up with similar devices in the electronics module.

The Key input output and control components found on the underside of the electronics module 1 of Fig. 1 are the visual display 5, the rechargeable battery 6, speakers 7, built-in microphone 8, privacy boom microphone 9, manual control buttons for power and menu scrolling 10, LED lights confirming operation 11, input/output jacks 12, the earphone jacks 13, volume control 22, earphone/built-in speaker switch 23 and the digital camera lens 19.

Fig. 2 is identical to Fig 1, except that the electronic module has been flipped over showing the upper surface of the module displaying the active pins 16 & 17 that



serve two major functions. First the pins connect to active electronics circuitry inside the electronics module. The pins have detachable pointed tips so they can be pushed through the baseball cap rim and mate up with two receptacles 20&21 in the side borders of the flexible solar cell 2 on the upper surface of the baseball cap rim. Once in place, the pointed tips of both pins screw off exposing electrical connections for the antenna and solar cell power cables. The left hand pin 16 provides the RF interface between the antenna 3 which screws onto the left side pin post 20, and the electronic module 1, anchoring the left side of the electronic module 1 and solar cell 2 to the baseball cap brim. The right hand pin 17 provides the power and recharging interface between the solar cell 2 and the electronic module 1. When the pointed pin top of right hand pin 17 is screwed off, power connections from the electronics module 1 are exposed and mated up with power wiring from the solar cell 2. The right side Pin post 17 is then capped with an electrical twist on wire connector [wire nut] 14 which would anchor the right side of the solar cell 2 and electrical module 1 to the baseball cap brim.

Fig. 3 illustrates the underside of a baseball cap with the electronic module 1 mounted in place on the underside of the baseball cap brim. The stereo speakers 7 would be

selected to maximize performance while minimizing size. The selection of the rechargeable battery 6 would be dependent on the communications electronics [/entertainment] functions mounted in the electronic module. Rechargeable Lithium ion batteries would be a good selection supporting individual or combinations of cell phone, two way communications, beeper, FM stereo, MP3 digital playback, or voice recording. Repackaging different combinations of other functions such as GPS receivers, digital still or video cameras may take alternate rechargeable battery supplies.

The built in microphone 8 would be sensitive enough to capture audio generated by the wearer of the Cap[/Visor] brim Integrated communications electronics [Multi-Media] apparatus. The built in microphone 8 would be disabled if the wearer of the apparatus wanted some privacy and lowered the boom microphone 9 from the stowed position underneath the baseball cap brim, to close proximity to the wearer's lips. The wearer would be able to lower the boom microphone to various settings through several ratchet settings where the boom microphone attached to the electronic module. The visual display 5 would take on various formats depending on the functions integrated into the electronic module 1. An LED display would be adequate to support individual or combinations of functions

like cell phone, two way communications, beeper, FM stereo, MP3 stereo and voice recording. Functions like digital photography, video, or GPS graphics would take a digital display with the kind of resolution typically found in those hand held devices. The Input/Output jacks 12 would follow the industry standards for functions like loading MP3 digital stereo music or down loading digital still photographs or video. Push button power and scrolling control buttons 10 have associated LED status lights 11. The earphones 4 are shown attached to the Velcro stow tabs. The earphone wires run along side the bottom of the baseball cap via the clips 15 [17], and patch into the electronic module at the earphone jack 13.

Fig. 4 represents a view of the electronics module mounted underneath the brim of a baseball cap on the head of a wearer with the wearer's head tilted upward. Both the display 5 and boom microphone 9 are in their stowed positions. The earphones 4 are inserted in the wearer's ears through the audio wires 15 which patch into the electronic module at the earphone jacks 13. As the apparatus is configured, the wearer could be listening to FM stereo or MP3 digital music, or by using the built-in microphone communicating via the cell phone or two-way communications function. Assuming those functional

electronic assemblies are integrated into the electronic module.

Fig.5 illustrates the mounting of the solar cell 2 and antenna 3 on the upper surface of the baseball cap brim. The solar cell 2 would be flexible in design and can use as much of the baseball caps brim as is necessary to keep the electronics module battery charged. The two receptacles where the active pins from the electronic module mounted beneath the baseball cap brim pierce the baseball cap brim and mate up with the solar cell 2 are shown under the twist on wire connector [electrical nut] 14 and the antenna hinge 16. The solar cell receptacles are spaced so as to match up with the spacing of the active pins on the upper surface of the electronics module. The antenna 3 has been collapsed and hinged 16 down to the horizontal stowed position. Different antennas may be needed for different operational functions. The FM stereo and cell phone frequencies are in a different band than the GPS receiver and therefore would need different antenna elements for the appropriate reception. This illustration also shows the earphones 4 in place in the user's ears.

Fig. 6 best illustrates the fact that in direct contact with the wearer, the electronics module is completely

undetectable [invisible]. The antenna 3 has been raised, extended and is active, the user selected the more private form of communicating, so the boom antenna 9 is lowered (disengaging the built-in microphone) to the users lips, and the earphones 4 are in place in both of the wearers ears. As a practical matter, the wearer would have to first apply power to the electronic module by pressing the power button and see the corresponding LED light up. The wearer would then drop the display and through a series of manual actions or voice commands scroll through an operational menu, then manually or voice command scroll to a particular phone number, channel, or scroll through MP3 digital music selections or FM radio frequencies.

Fig. 7 [6A] is identical to Fig. 6, except that in this illustration, the visual display 5 with the digital camera 19 mounted on its outer surface is deployed to its vertical and active position.

Fig. 8 [7] is the right side view of the apparatus with the display 5 lowered to the vertical position, the antenna 3 vertical and extended on the hinged antenna base 16, and the earphones 4 inserted in the wearers ears. The audio wires between the earphones and the earphone jack on the electronic module is secured to the baseball cap brim by the

plastic clips 15. The outer surface of the earphones have Velcro material glued on. The inverted earphone is stowed on the Velcro pad that is pinned or glued to the back of the baseball cap 18. The Velcro pad is positioned on the baseball cap such that the earphone can be stowed on it when not in use or inserted into the ear when operational always leaving some slack in the audio wire.

Fig. 9 [8] is the left side view of the cap brim mounted apparatus with the display 5 deployed and active, the boom microphone 9 deployed and active, the earphone in the ear canal and the antenna 3 stowed, although it may be radiating in the horizontal position.

## **ADDITIONAL/ALTERNATIVE EMBODIMENTS**

Fig. 10 [9] illustrates the relocation of the visual display 5 with the Digital Camera 19 capability added to the outer surface. The display in the preferred embodiment was more centered in the electronic module, and in this case it is moved over the right eye.

Fig. 11 (NEW) illustrates the full face drop down display 5. In this case, the display would completely cover the bottom side of the electronic module and hinge down for viewing by both eyes. This display is practical for broadcast TV, or GPS map viewing. All of the electronics modules controls, built-in speakers, built-in microphones, I/O ports and batteries would have to be on the back side of this display or covered by the display when it is in it's stowed horizontal position. The technology is mature enough for that sort of a display and there are several products on the market today that provide this feature on eyeglass like rims which hang on the nose and over the ears.

Fig. 12 (NEW) illustrates the concept of having the electronics module configured with a port 25 that has an adapter into which digital memory cards 24 are plugged, each card having a different communication/entertainment function, or combinations of functions. The head wearable communications electronics {multi-media} apparatus would then be programmed to perform in accordance with the functional card that happened to be plugged into the port.

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